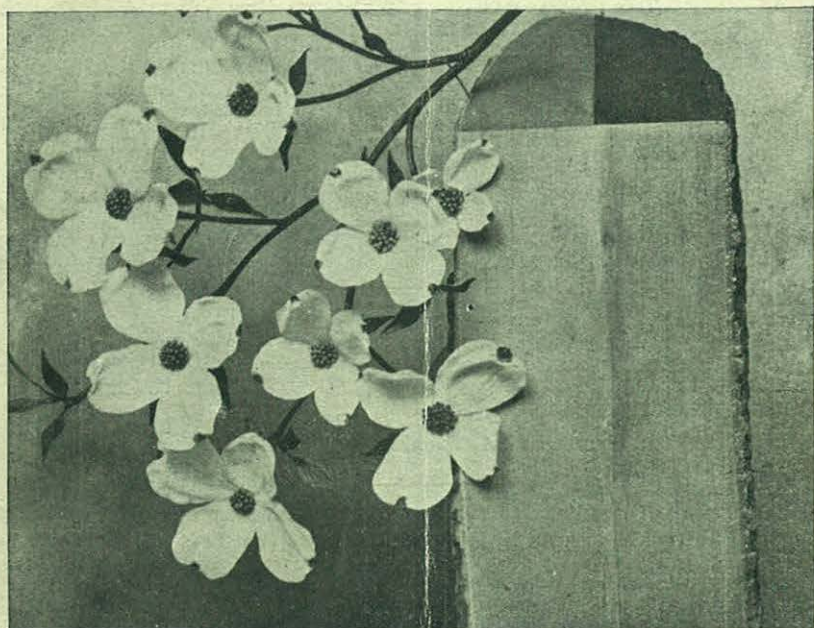


S. C. Bishop.

AMERICAN MUSEUM OF NATURAL HISTORY

Plant Forms in Wax



WAX MODEL OF FLOWERING DOGWOOD, FORESTRY HALL

Department of Preparation and Installation

GUIDE LEAFLET NO. 34

NOVEMBER, 1911

American Museum of Natural History

Seventy-seventh Street and Central Park West, New York City

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MAKING WAX LEAVES

The method of making leaves described in this Leaflet, depending on the use of Mousseline de Soie, the mysterious "fabric" of the Mogridges, has been largely superseded by the use of cotton batting. The advantages of cotton batting are that the leaf is homogeneous in composition and is less liable to curl or split, and that the stem wire is more securely imbedded in and attached to the substance of the leaf. The material is also more readily obtained, especially in small places. The finer the quality the better, but it is not necessary to use the finest and softest for large leaves.

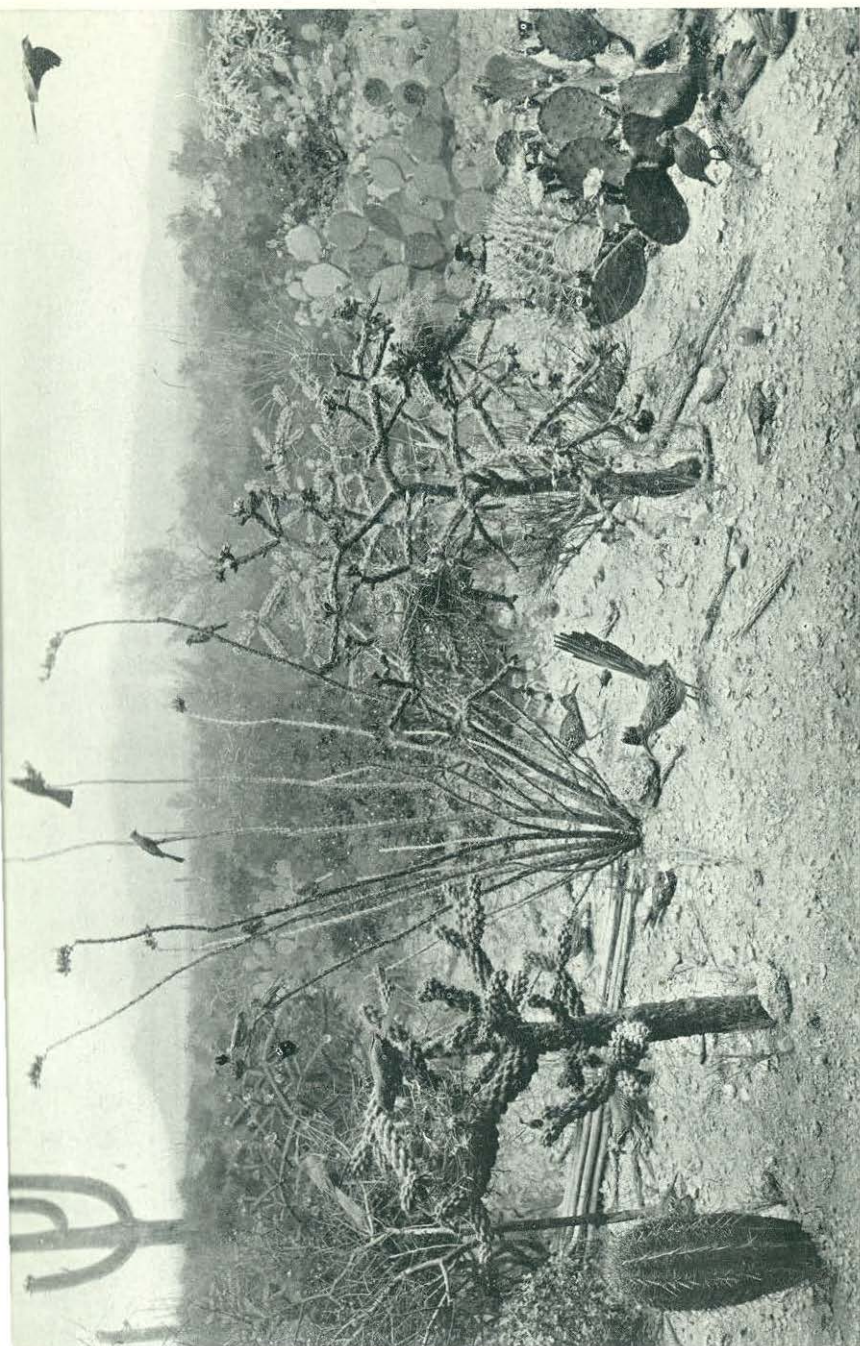
A thin layer of cotton is spread over the lower half of the mold, the stem laid on this and, if the leaf is thick, a very little cotton laid on the stem; melted wax is then poured over this and the upper part of the mold pressed upon the mass.

The use of molds hardened in paraffin, as noted on page 12, is attended with some difficulty, as wax has a tendency to adhere to them; a simpler method of hardening molds is to boil them for from ten to twenty minutes, according to size, in a strong solution of borax.

If a mold is to be used a great many times a good plan is to place it in hot linseed oil for about 5 minutes and let it dry for a week or ten days before using.

Finally where large numbers of leaves of a kind are to be made, the molds are often made in type metal or bronze and these are fastened to wood or metal frames, hinged together at one end on the principle of an old-fashioned lemon-squeezer. The lower arm may be fastened to a table, and, in the case of large leaves, it frequently happens that two persons may work together to good advantage, one spreading the cotton and pouring the wax, the other doing the squeezing and removing the leaf from the mold. In the case of large parti-colored leaves, for example, green and white or green and red, two colors of wax may sometimes be used to advantage.





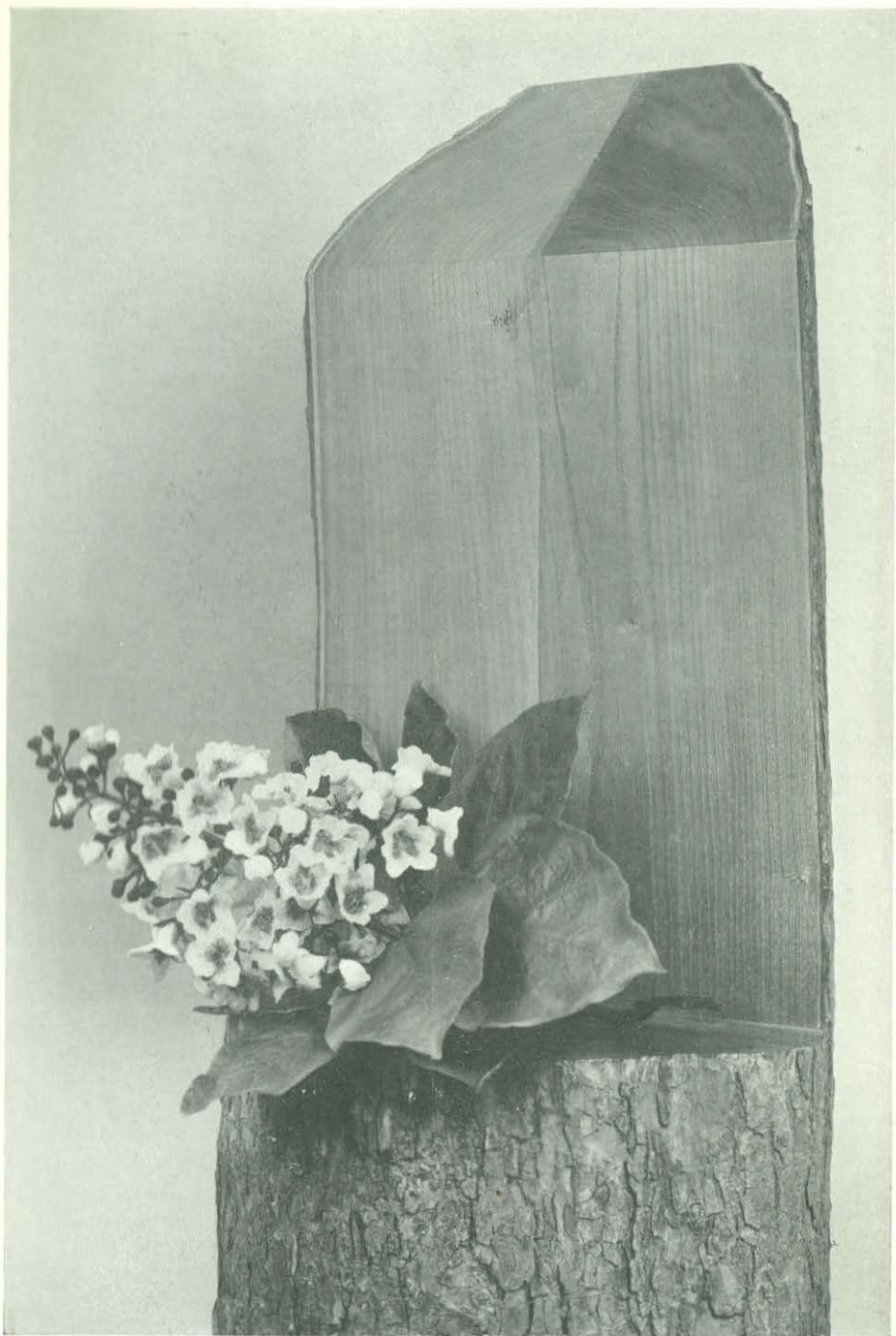
A CACTUS DESERT AND ITS BIRD LIFE

In reproducing a cactus the spines must be removed and replaced in their proper position on the wax cast



AT THE EDGE OF THE JUNGLE

Orchid, ferns and vines of India reproduced in wax to show haunt of water monitor and cobra



WAX REPRODUCTION OF CATALPA FLOWERS AND LEAVES

Many of the models in the Forestry Hall are so accurately copied from life that observers, sometimes even botanists, judge them natural instead of artificial and send questions to the Museum concerning methods of preservation



THE BULLFROG GROUP

Birch, alder and willow, pickerel weed, swamp azalea and white water lilies give an unusual effect of realism notwithstanding that all are reproductions in wax

PLANT FORMS IN WAX

SOME METHODS EMPLOYED

IN THE

Department of Preparation and Installation

OF THE

American Museum of Natural History

By E. C. B. FASSETT

NEW YORK
Published by the Museum
November, 1911

3/30/53

NO. 34

OF THE

GUIDE LEAFLET SERIES

OF THE

AMERICAN MUSEUM OF NATURAL HISTORY

MARY CYNTHIA DICKERSON, Editor



A SMALL PORTION OF THE BULLFROG GROUP SHOWING PICKEREL WEED

PLANT FORMS IN WAX

SOME METHODS EMPLOYED IN THE DEPARTMENT OF PREPARATION AND
INSTALLATION OF THE AMERICAN MUSEUM OF NATURAL HISTORY

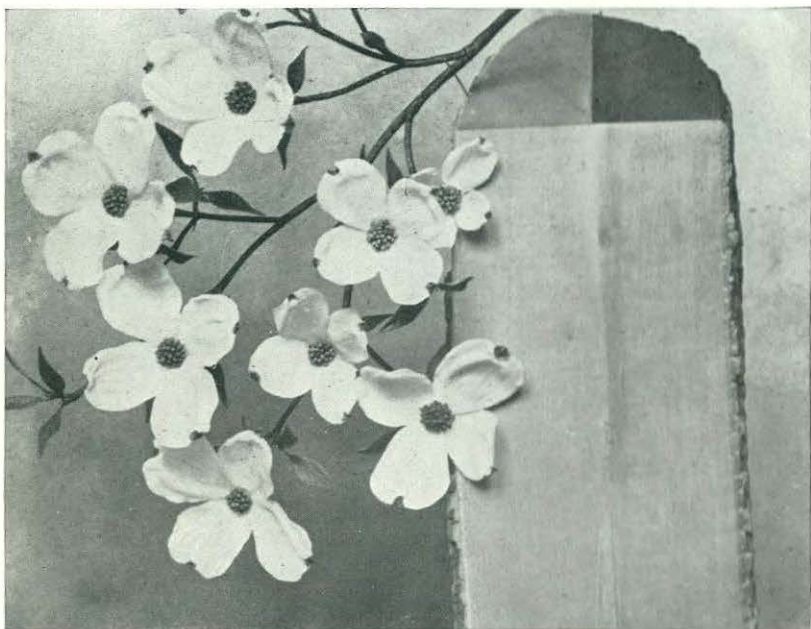
BY E. C. B. FASSETT

Introduction

THE preparation of exhibits is a primary function of a museum and public appreciation of such an institution is largely dependent upon the excellence attained in this preparation. Moreover, the attractiveness and instructive force of an exhibit often depend almost as much upon the accessories employed in connection with the objects as upon the objects themselves. Thus, a group of birds, of mammals, or of insects must often be arranged to show relation to natural surroundings, therefore requiring foliage which must be reproduced by artificial means since plants in drying do not retain their strength or their lifelike appearance.

The work of the taxidermist in a museum is supplemented nowadays by that of the wax modeler, the glass blower and the plaster worker. Several handicrafts, indeed, contribute to the finished exhibit, including those of the photographer, painter and clay modeler. All these handicrafts have community interests and one is the supplement of the others in the attainment of desired results.

The composition of a group to be assembled must be built on photographic realism in a science museum where accuracy is one of the large



MODEL OF FLOWERING DOGWOOD IN THE FORESTRY HALL

aims. A bird group, for instance, with its painted canvas background and real foreground must be based not only upon actual photographs but on field notes as well, made by an artist colorist. Plants, sections of shrubs, flowers and every significant detail of the immediate habitat, such as sticks, stones, earth, grass and dead leaves, are collected for the realistic foreground. A landscape painter makes the background and the craftsmen strive to blend the foreground with this background and thus bring the entire group into lifelike harmony.

After color notes and photographs have been made of the plants necessary for a certain group, plaster molds are made of the leaves and flowers. These molds are best prepared from fresh specimens, but are obtainable also from specimens preserved in formaldehyde.

The methods which have been worked out in the Department of Preparation of the American Museum all strive for artistic realism of detail, and while the spectator's interest centers in the birds or other natural history specimens for whose proper exhibition the group has been assembled, the accessories also claim appreciative notice. The successful reproduction in wax of the various plant forms is accomplished by persistent experiment, for each new object is in some degree an individual problem. Some of the methods employed, and in many cases evolved by the wax workers in the progress of their work, are explained by the accompanying series of photographs which even without the explanatory notes would give a comprehensive idea of many of the processes.

LEAF-MAKING

An apprentice wax worker is first taught leaf-making, the simplest part of the work. Photographs from the growing plant are made in the field for later guidance. Then in the laboratory of the Museum, after the

**Plaster
Molds**

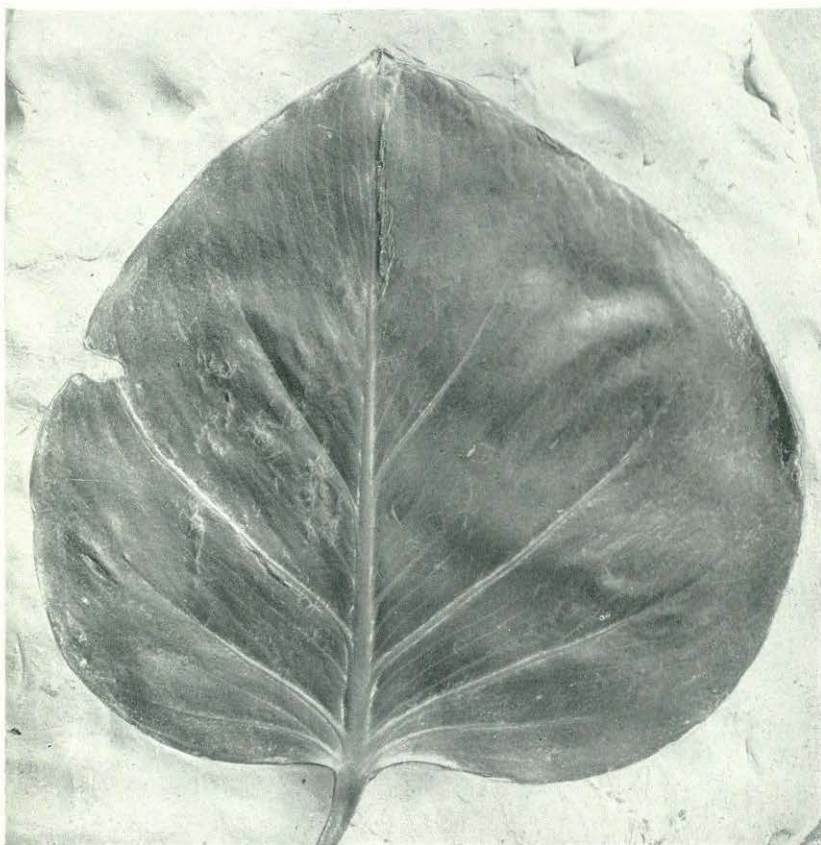


WHITE AZALEA AND BIRCH OF THE
BULLFROG GROUP

branches which are to be used

are selected, plaster molds are made of a series of leaves to secure a variety of sizes. The molds, after being thoroughly dried and immersed twenty minutes in hot paraffin, are ready for use.

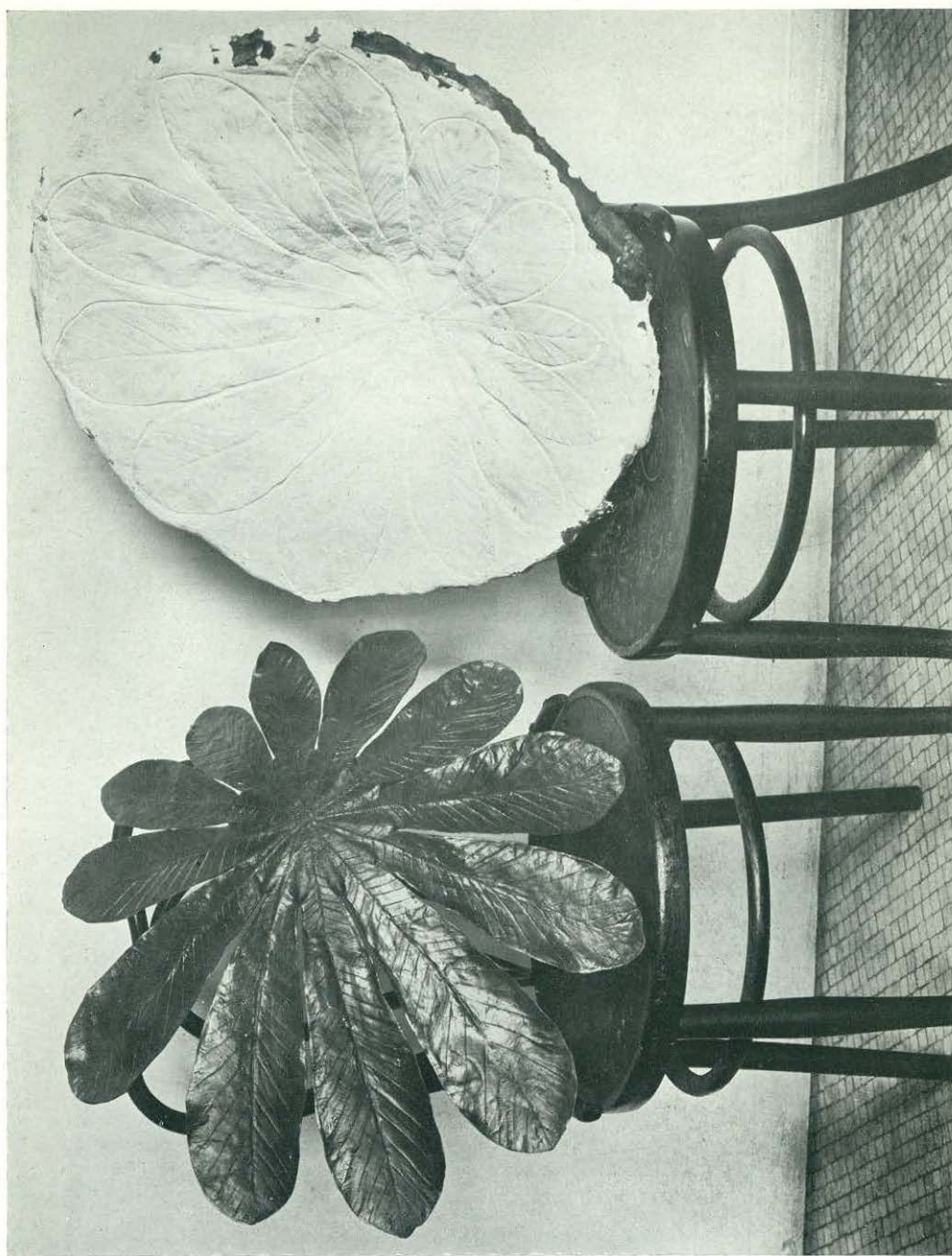
The simplest mold is the one-piece mold used in the reproduction of many leaves and flower petals. The leaf or petal is laid face upper-



MAKING A MOLD OF A LEAF

A thick heavy leaf (7 in. x 8 in.) pressed into a clay bed ready for the pouring of the plaster over it to make the mold

most on a surface of clay, the clay bedded up beneath and around to support the leaf in its natural position and plaster of Paris mixed and poured over it. When the plaster has set, the leaf is removed and the superfluous plaster trimmed away around the impression.



PLASTER MOLD OF A LARGE TROPICAL LEAF

The completed reproduction measuring twenty inches in diameter rests on an ordinary chair

Squeeze molds and piece molds, the former usually of two pieces, the latter of two or more pieces, are made in much the same way although they differ in use. The upper of the two pieces of the squeeze mold



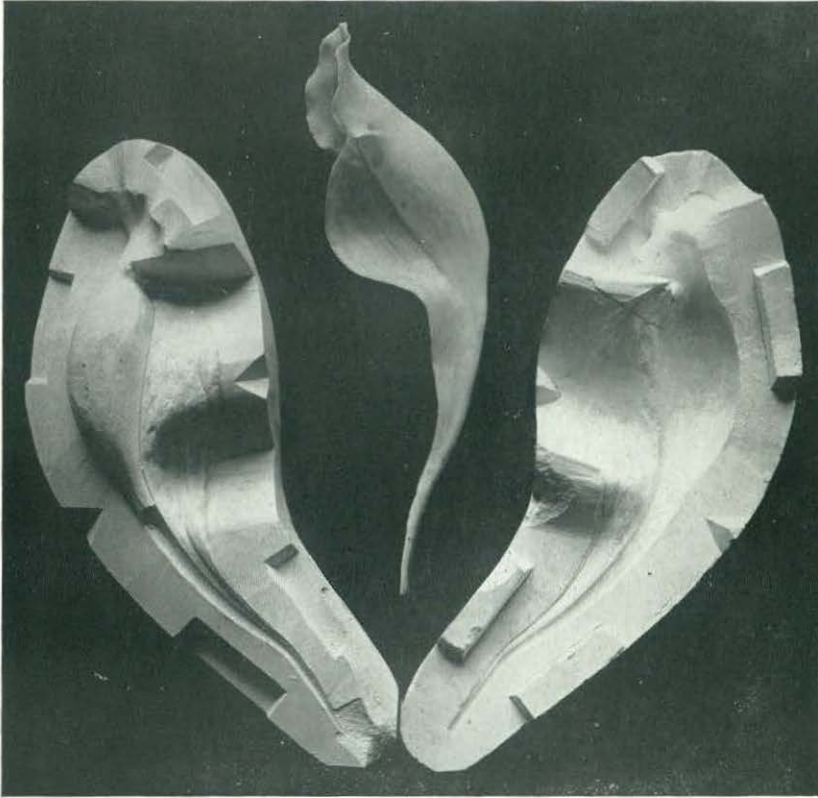
COMPLETED WAX REPRODUCTION OF LEAF

Tropical leaf (13 in. x 18 in.) which has been laid back into the plaster mold to restore modeling of the surface which may have been lost in the trimming process. The supporting wires are very conspicuous on the back but appear only as a part of the venation on the face of the leaf

fits into the lower which is usually concave or cup-shaped. The wax is poured into the lower mold and the upper is forced down into it to squeeze out the excess of wax. The two or more pieces of the piece

mold when held together form a receptacle into which wax is poured through a funnel-like "gate" cut in the plaster.

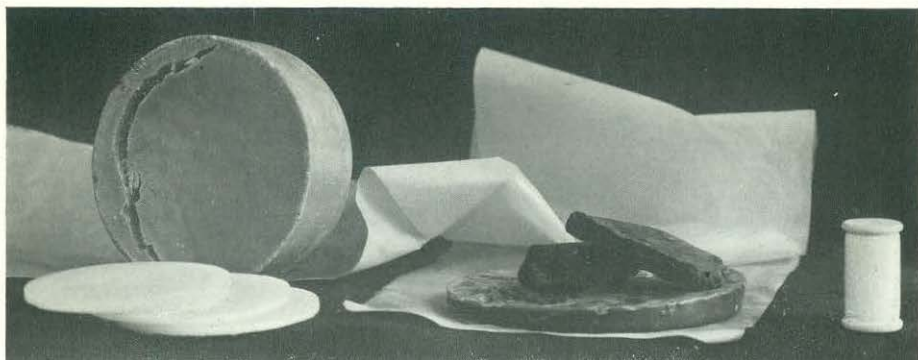
The materials used for the reproduction of the leaf are sheet wax,



A COMPLETED WAX LEAF OF SARRACENIA, OR PITCHER PLANT, AND A PAIR OF THE SQUEEZE MOLDS USED IN MAKING ONE HALF OF IT

There must be a duplicate pair of squeeze molds, minus the keeled part, for the other half of the leaf. The two sections of the wax leaf are welded with a hot tool. Much of the beauty and delicacy of this result depends on the trimming and beveling of the edges of the wax and the artistic feeling displayed by the craftsman

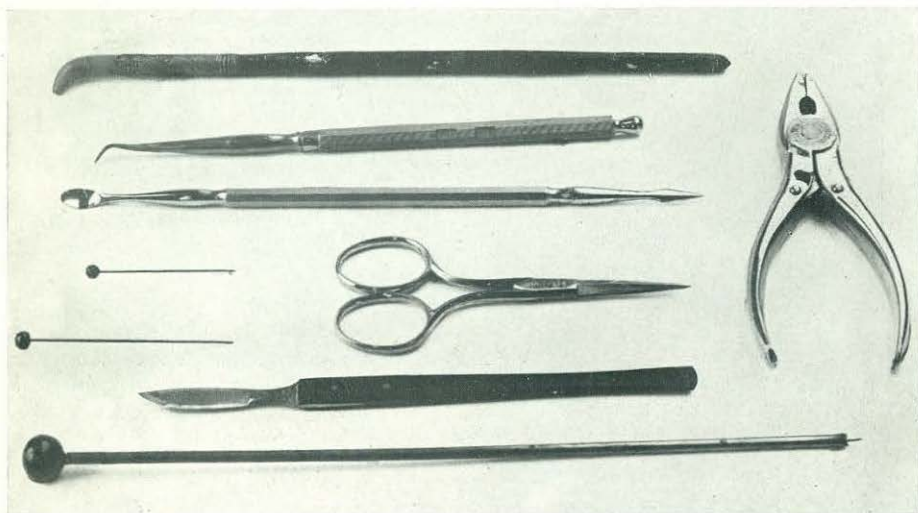
The waxed gauze and wire, the sheet wax forming the face of
Materials the leaf, the waxed gauze the back and the wire the ribs.
for the Leaf The wax should be pure bleached beeswax with a small
 amount of Canada balsam, that is, about one tablespoonful for each



SOME MATERIALS USED IN MAKING WAX LEAVES AND FLOWERS

Three discs of bleached beeswax; two pieces of wax which have been prepared for use by tinting and by the addition of Canada balsam to give pliability; a piece of waxed gauze and a spool of wire

quart of the melted wax. The wax should be heated in a double boiler. Waxed gauze is prepared by dipping strips of bolting cloth or mousseline de soie into hot wax and withdrawing vertically over a glass rod with



SOME TOOLS USED IN WORK WITH WAX

Hat pins and smaller pins with glass heads used for modeling edges of leaves and petals as well as for many other purposes; a sharp knife for beveling edges of leaves and petals; small scissors for serrating leaf margins; a wire cutter; a spoon-like tool which may be heated to melt and hold a few drops of wax for welding; a general utility tool where heat is needed; a larger agate tool which supplements the fingers in welding the waxed gauze into deep ridges



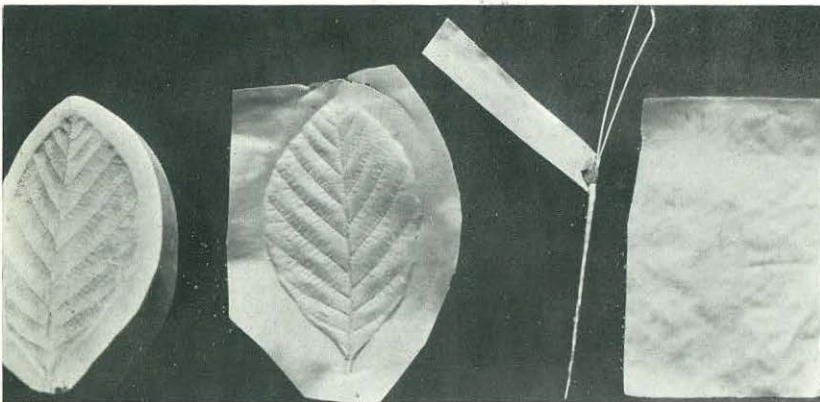
FLOWERS AND FRUITS OF THE PAPAW

Many of the wax models in the Forestry Hall reproduce the texture of flowers and fruits in a remarkable way



THE OPERATION OF WAXING THE GAUZE

Wax is brought to a boiling point in a double boiler, tinted the desired shade and a small quantity of Canada balsam added. A strip of gauze (mousseline de soie) is submerged in the boiling wax and then drawn out vertically across a glass rod, with greater or less speed as a thin or thick coating of the wax is desired. A still thicker waxing is obtained by omitting the use of the glass rod and blowing upon the gauze as it is withdrawn



MATERIALS USED IN THE PROCESS OF MAKING SMALL LEAVES

Plaster mold of the original leaf [at the left]; an impression upon a sheet of wax which was laid over the wet plaster mold and worked with the warm fingers into every detail of the mold; the wire midrib partly wrapped with waxed gauze; piece of waxed gauze which must be welded to the wax after the adjustment of the midrib

Two pieces of wire are used for the midrib, one extending a short distance beyond the other for the sake of delicacy. All the work on the leaf until ready for trimming or serrating the edges is done while it lies on the plaster mold

greater or less speed as a thin or thick coating is desired. Still greater thickness of the wax is obtained by omitting the use of this rod, simply dipping the strips of cloth and letting them drip while blowing on the hot wax.

The wax is tinted by mixing small quantities of oil color in a ladle of fluid wax which is afterward gradually added to the heated mass until the desired shade is obtained.

Silk-wound wire, which should vary in thickness according to the size and weight of the leaf, is taken from the spool and stretched until it no longer curls; then it is cut into suitable lengths for the midribs. Heavy wire and additional supporting ribs are used for the largest leaves and are covered with strips of waxed gauze to bring about more complete adhesion with the wax of the leaf. A sufficient quantity of wires, sheet wax and waxed gauze is prepared in advance for the work planned.

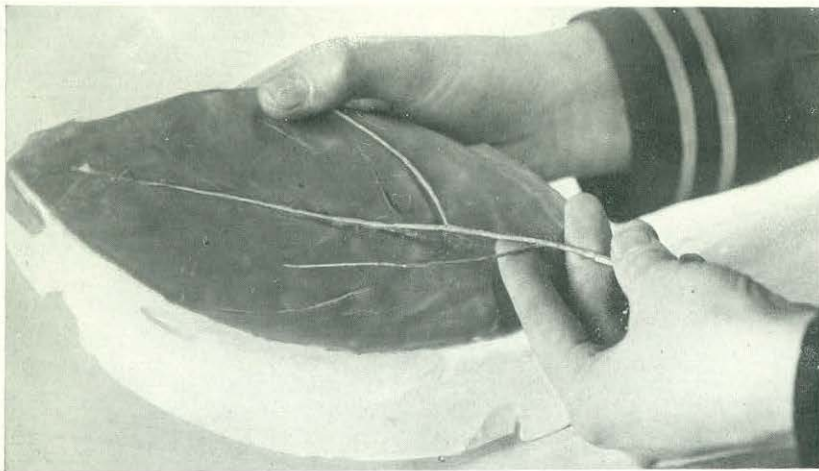
A piece of this sheet wax is warmed over the flame of the spirit lamp or Bunsen burner and applied to the plaster mold, the surface of which has been previously dampened with cold water to prevent adhesion of the wax. The wax is molded with

the finger tips until there appears on the wax a good impression of the pattern of the plaster mold underneath. The wire for the midrib is then laid in its proper position upon the wax and covered with a sheet of waxed gauze. The task of welding this gauze to the wax requires care and patience as all air-bubbles must be worked out and the details of venation sharply defined.



PRESSING THE SHEET WAX INTO THE PLASTER MOLD

After placing the wire for the midrib in position, the waxed gauze is welded to the wax. For deeply veined or ridged leaves a rubber tool facilitates the work

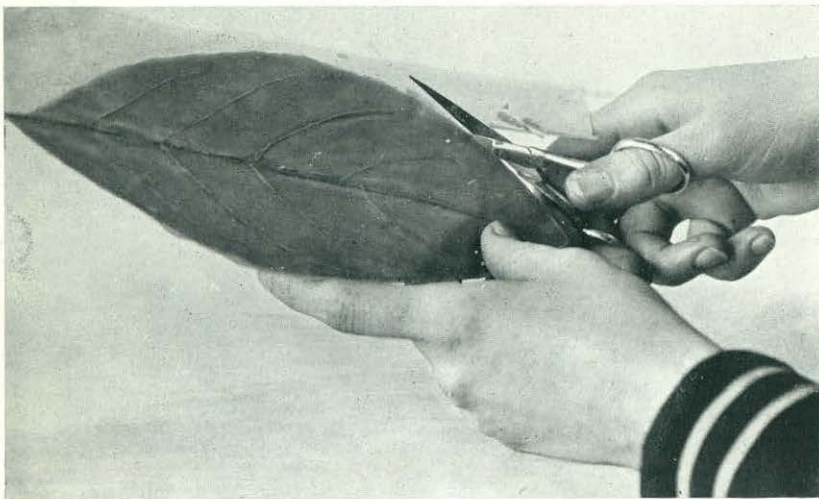


THE ADJUSTMENT OF THE WIRE SKELETON TO A WAX LEAF

Before removing the leaf from the mold, the marginal outline is indicated and welded either with the finger nail or some pointed instrument.

The serration of the margins of the leaves calls for deftness and considerable practice. Slightly heat small sharp scissors; then, beginning the cutting at the lower right side of the leaf, let forward, sliding strokes of the scissors alternate

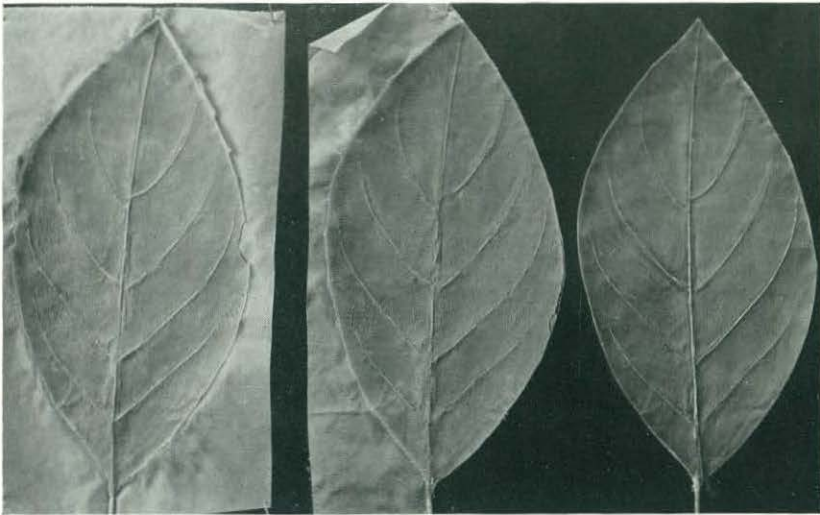
**The Leaf
Margin**



TRIMMING THE MARGIN AFTER THE 'WAXED GAUZE HAS BEEN FIRMLY WELDED
The position is the same as in the process of serrating the leaf edge

with short horizontal strokes until the tip of the leaf is reached. Then reverse the leaf and cut the left side by a descending process which also reverses the motions used on the opposite edge. After the serration, the leaf is again carefully applied to the mold, the serrated edges are re-welded and the contour of the leaf perfected.

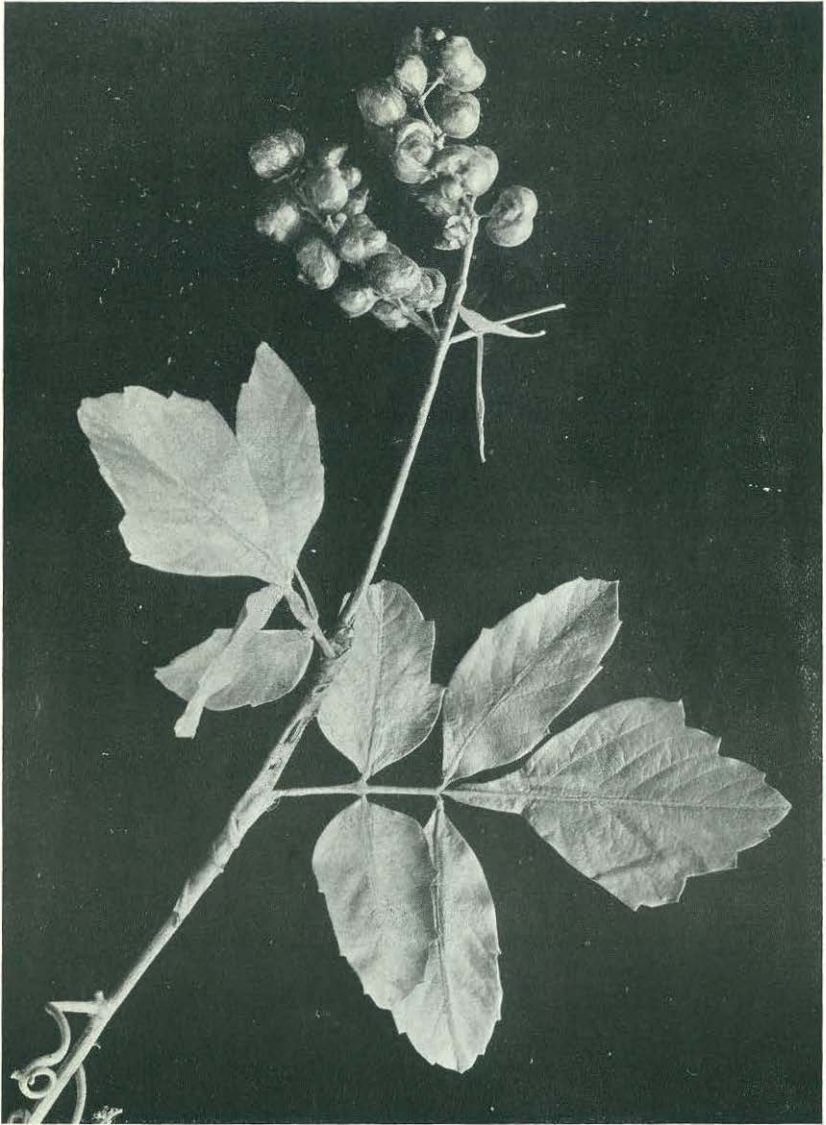
After the colorist has tinted the leaves either by hand or with the aid of an air-brush, they are ready for attachment to stems. **Attach-ment to the Twig** Small stems are made of silk-wound wires wrapped with waxed gauze; they are tinted and then attached to the



THREE PHASES IN THE PROCESS OF CUTTING OUT A LARGE LEAF

In each figure there is presented the back of the wax leaf (6 in. x 3 in.). The leaf was made by the flowing process and has the wire skeleton adjusted and the waxed gauze welded

original wood. In the case of larger stems the original woody branch is used having first been subjected to treatment with glycerine and formaldehyde, which preserves the original bulk of the woody fibre. In attaching each leaf, a hole is drilled at the point of juncture and the wire stem of the leaf passed through and secured. All evidences of the attachment are carefully obliterated by wax and color.



ILLUSTRATING METHOD OF ATTACHING WAX FRUIT AND LEAVES TO THE ORIGINAL BRANCH

The berries are cast in piece molds, then modeled in more detail by hand. The wire stems are inserted in holes made with a hot tool and the berries are grouped on a wire stem. This stem is wrapped with waxed gauze and covered with a flow of wax. A portion of this heavier wire is left uncovered and inserted into a hole bored in the natural stem or branch. After the wire is secured it is wrapped with waxed gauze, covered with modeled wax and tinted, making a juncture as much like nature as possible

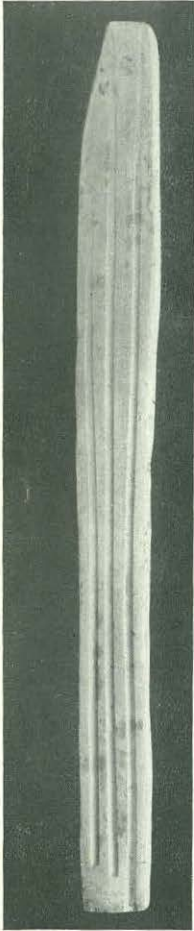


POURING THE HOT WAX OVER A PLASTER MOLD

In making large leaves like hellebore, pickerel weed and many tropical leaves, sheet wax is not used; instead hot wax is poured directly over the mold which has been previously placed in hot water to expel air from the plaster. This flowing process greatly facilitates the work. In the reproduction of a large leaf many wires must be used to serve not only as midribs but as additional supports for the heavy mass of wax. The wire of the

**Flowing
Process or
Leaf Cast-
ing**

midrib is attached to a heavier wire and wrapped throughout its length with waxed gauze until the proper size is attained. The welding of the waxed gauze must be done with care, the agate tool supplementing the use of the fingers. Finally the leaf is ready for the colorist.



Cactus may be cast in piece molds and the original spines inserted in the wax.

Cactus, original spines inserted in the wax.

Cat-tail, Bladelike leaves of cat-tails may be

Grass made from molds. A thin layer of hot wax is flowed into the mold and into this a strip of waxed gauze is pressed. A midrib of fine steel wire wrapped with waxed gauze, is carefully adjusted and over this a second flow of hot wax is poured, and over the wax again a second piece of waxed gauze is welded by passing a hot tool over the surface. Blades of grass are cut from heavily waxed gauze and are modeled by folding them laterally over the edge of a knifelike strip of tin fixed in a wooden base. Very little manipulation is required. No rib is used, but each blade from a short distance above the base is rolled about a wire and several blades are then attached to a heavier wire stem.

FLOWER-MAKING

Flowers are more difficult to reproduce in wax than are leaves because more complex

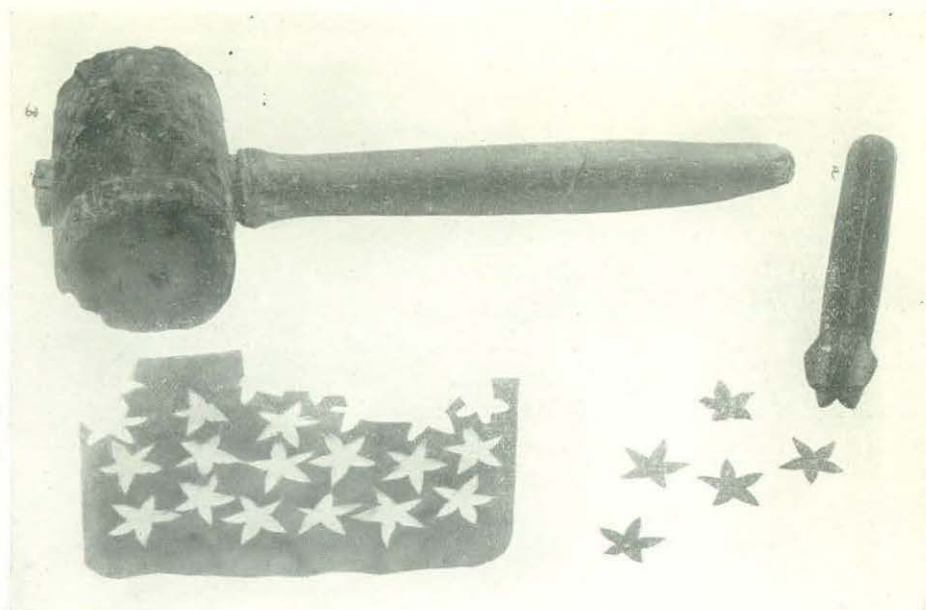
Flowers than are leaves because more complex

Made with and may be made by various meth-

a Die ods. More often they are cut out from waxed gauze with a die, or perhaps with scissors according to a pattern. A die is usually made for simple monopetalous flowers such as pickerel weed, the tube being cut lengthwise and the corolla

PLASTER MOLD FOR MAKING THE BLADES OF THE CAT-TAIL

The three indentations in this mold were made by pouring soft plaster over the fresh green plant. Hot wax is poured into the mold in a thin layer and a sheet of waxed gauze welded into it. Fine steel wires, one extending beyond the other for the tip of the leaf, are wrapped with a strip of waxed gauze and adjusted along the middle line. Over the wire there is a second flow of wax and over the wax a second strip of waxed gauze which again is covered with a flow of wax. A hot tool is then run over the surface and a perfect welding made



DIE, MALLET AND WAXED GAUZE FROM WHICH SEPALS HAVE BEEN CUT

The waxed gauze is laid on a wet block and the die is also dipped into water to prevent adhesion of the wax. A sharp blow from the mallet forces the die through the gauze with a clean-cut edge. A die is used when many small parts like sepals or delicate petals are required

spread out to make the pattern for the die. Such corollas can be cut with one blow of the mallet on the die. Then with a hot tool the tube is welded together, while the petals are curled and adjusted according to life position.

For monopetalous corollas of more complex contours such as catalpa, **Squeeze** squeeze molds are used, each consisting of two parts the **Molds for** upper fitting into the lower. In this process hot wax is **Flowers** poured over the lower half of the mold and a piece of gauze is pressed into the wax with an agate tool. A second flow of wax is poured over it, and the obverse or upper half of the mold is pressed down squeezing out all superfluous wax. The whole is then thrown into cold water until the wax is hard, when the cast is removed from the mold with the assistance of a glass rod. The impressed wax is trimmed, the rim edges beveled and the edges of the corolla tube welded by means of a hot tool. In still more complex flowers, as some orchids, it is necessary to subdivide and make molds for each half. The welding of the two halves requires skill. The foliage of the pitcher plant also is made in this manner.

The stemlike parts of pistils and stamens are reproduced from
Pistils thread which has been drawn through boiling wax under
and the pressure of a brush. Sometimes fine wires are used in
Stamens the same way. Stigmas and anthers are made of colored
wax applied with a hot tool to the tips of these stemlike parts.

Objects of considerable thickness such as buds of water lilies and
Piece Molds magnolias, or buds of any large fleshy flower must be cast
for Thick in piece molds, as also are berries and fruits. There
Buds and is necessarily some trimming of the tips and stem ends in
for Fruits the making of these forms. A hot wire is thrust into the
stem end of the bud or the fruit which is thus fastened to the branch.

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